International Surgery Journal
Shaik NMS et al. Int Surg J. 2024 Sep;11(9):1510-1514
http://www.ijsurgery.com
pISSN 2349-3305 | eISSN 2349-2902

DOI: https://dx.doi.org/10.18203/2349-2902.isj20242451

Original Research Article

Management of early hollow viscus perforation: laparoscopic repair in contrast to laparotomy repair

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Received: 24 May 2024
Revised: 18 June 2024
Accepted: 08 August 2024

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ABSTRACT

Background: Acute abdomen refers to severe abdominal pain that occurs suddenly. This study was conducted to compare open versus laparoscopic repair for the treatment of early hollow viscus perforation.
Methods: The study involved 50 patients of both genders, divided into two groups. Group I underwent laparoscopic repair, while group II underwent open repair. Variables such as the time taken for resumption of daily activities and operative time were recorded for all patients. Study was done in Kamineni institute of medical sciences, Narketpally Nalgonda (d.t) Telangana prospective observational study for a period from March 2023 to April 2024.
Results: Abdominal distension occurred before pain in 7 patients in group I and 6 patients in group II, after pain in 4 patients in group I and 3 patients in group II, and with pain in 14 patients in group I and 16 patients in group II. Bilious vomiting was observed in 12 patients in group I and 11 patients in group II, while no vomiting occurred in 13 patients in group I and 14 patients in group II. Gastric perforation was diagnosed in 5 patients in group I and 5 patients in group II, ileal perforation in 2 patients in group I and 3 patients in group II, and duodenal perforation in 18 patients in group I and 17 patients in group II. The difference was significant ($p<0.05$).
Conclusions: This study compared laparoscopic and open repair for hollow viscus perforation in 50 patients. Both groups had similar demographics and initial clinical characteristics. The laparoscopic group experienced significantly shorter surgical times (102.08 vs. 133.52 minutes, $p<0.0001$), shorter hospital stays (most discharged within 7-14 days vs. 14-21 days), and quicker resumption of daily activities (9.32 vs. 13.68 days, $p=0.0042$). These findings suggest that laparoscopic repair offers advantages in terms of faster recovery and reduced hospital stays compared to open repair, making it a preferable option for managing hollow viscus perforations.

Keywords: Acute abdomen, Laparoscopic repair, Hollow viscus perforation, Management of early hollow viscus perforation, Laparotomy ileal perforation, Gastric perforation

INTRODUCTION

Acute abdomen refers to severe abdominal pain that occurs suddenly. Various conditions can cause acute abdomen, with hollow viscus perforation being the most common cause, accounting for approximately 5 to 10% of all emergency admissions.[1] This condition requires immediate surgical intervention.[2] Increased morbidity and mortality in patients with acute abdomen are often due to overlooked diagnoses and delayed treatment.

However, the incidence of these complications has significantly decreased due to advancements in medical and diagnostic facilities. Among the risk factors for perforation, smoking, the use of non-steroidal anti-inflammatory drugs (NSAIDs), and other over-the-counter analgesics are the most prominent.

Laparoscopy has gained increasing popularity over time.[3] Initially, it was primarily used for elective surgeries, as the impact of pneumoperitoneum on acute abdomen with peritonitis was not well understood. Nevertheless, the

diagnostic benefits of laparoscopy for acute abdomen have been recognized, and its therapeutic potential has proven advantageous in surgical practice.[4]

Prompt and effective treatment is crucial for managing cases of hollow viscus perforation. Open repair has traditionally been the most common and popular approach; however, laparoscopic repair is emerging as an efficient alternative procedure with numerous advantages.[5]

Studies have demonstrated that perforations can be safely closed using laparoscopy. Nevertheless, it remains undecided whether the laparoscopic approach is superior to conventional open repair.[6] Some authors suggest that laparoscopic repair of perforations is both feasible and beneficial, particularly in terms of significantly reducing the mean duration of hospital stay.[7]

This study was conducted to compare the outcomes of open versus laparoscopic repair for the treatment of hollow viscus perforation, aiming to determine which method offers better patient outcomes.

METHODS

The present study was conducted in Kamineni institute of medical sciences, Narketpally, Nalgonda (d.t) Telangana. Prospective observational study for a period from March 2023 to April 2024 and included 50 patients of both genders. All participants were informed about the study, and written consent was obtained. Ethical clearance was secured prior to commencing the study.

Exclusion criteria

Patients with inflammatory bowel disease, malignancy, connective tissue disorders, coagulopathies, renal failure, liver failure, substance abuse, and those who did not consent to participate were excluded.

Late peritonitis cases presentation.

Inclusion criteria

It includes patient with age 15 to 65 years, early present with hollow viscus presentation without peritonitis.

Data such as name and age were recorded for each patient. A thorough clinical examination was performed on all participants. The patients were then divided into two groups: group I, in which laparoscopic repair was performed, and group II, in which open repair was performed.

Patients underwent routine blood investigations, including complete blood count, total leukocytic count, differential leukocytic count, platelet count, liver function tests, and serum blood sugar levels. Renal function tests, including serum creatinine and urine tests, were also conducted. Additionally, an erect abdominal X-ray was taken.

Variables such as the time taken for resumption of daily activities and operative time were recorded for all patients. The results obtained were subjected to statistical analysis, with a p value of less than 0.05 considered significant.

RESULTS

Table 1 shows that each group had 25 patients, in group I patients., laparoscopic repair was performed and in group II patients, open repair was performed.

Table 1: Distribution of patients.

Groups	I	II
Method	Laparoscopic repair	Open repair
Number	25	25

Age

The mean age of patients in group 1 (undergoing laparoscopic repair) was 37.44 years, with a standard deviation (SD) of 10.82 years. In comparison, patients in group 2 (undergoing open repair) had a slightly higher mean age of 38.36 years, with a similar standard deviation of 11.14 years.

The difference in mean ages between the two groups was not statistically significant, as indicated by the p=0.76. This suggests that there was no significant difference in the ages of patients between the two surgical groups.

Table 2: Age distribution in years.

Age (in year)	Group 1	Group 2
Mean	37.44	38.36
SD	10.82	11.14
P value	0.76	

Assessment of parameters

In group I, consisting of 25 patients who underwent laparoscopic repair, abdominal distension before pain was observed in 7 patients, while in group II, consisting of 25 patients who underwent open repair, it was observed in 6 patients. The p value for this comparison was 0.83, indicating no significant difference between the two groups.

When considering abdominal distension after pain, 4 patients in group I and 3 patients in group II experienced this symptom. Additionally, distension with pain was reported in 14 patients in Group I and 16 patients in group II.

Bilious vomiting was noted in 12 patients in group I and 11 patients in group II, with a p=0.77, suggesting no

significant difference between the groups. Conversely, 13 patients in group I and 14 patients in group II did not experience vomiting.

Fever was present in 9 patients in Group I compared to 14 patients in group II. Although not all p values are provided for each comparison, these observations highlight the clinical symptoms experienced by the patients in both groups.

Table 3: Assessment of parameters.

Variables	Group I, (n=25)	Group II, (n=25)	P value
Abdomen distension before pain	7	6	0.83
Abdominal distension after pain	4	3	
Distension with pain	14	16	
Bilious vomiting	12	11	0.77
No vomiting	13	14	
Fever	9	14	

Diagnosis

During intraoperative diagnosis, gastric perforation was identified in 5 patients in group I (laparoscopic repair) and 5 patients in group II (open repair), with a p=0.89, indicating no significant difference between the two groups.

Ileal perforation was observed in 2 patients in group I and 3 patients in group II. Duodenal perforation was the most common diagnosis, found in 18 patients in group I and 17 patients in group II. These findings suggest that the types of perforations were similarly distributed across both groups, with duodenal perforation being the predominant condition in both sets of patients.

Table 4: Diagnosis.

Intraoperative diagnosis	Group I, (n=25)	Group II, (n=25)	P value
Gastric perforation	5	5	0.89
Ileal perforation	2	3	
Duodenal perforation	18	17	

Surgical time

The distribution of surgical times varied significantly between group I (laparoscopic repair) and group II (open repair). In group I, 12 patients had surgical times ranging from 90 to 100 minutes, compared to only 1 patient in group II. Surgical times between 100 and 110 minutes were observed in 8 patients in group I and 3 patients in group II. Both groups had 5 patients with surgical times between 110 and 120 minutes.

Notably, no patients in group I had surgical times extending beyond 120 minutes. In contrast, group II had longer surgical times, with 4 patients between 130 and 140 minutes, 5 patients between 140 and 150 minutes, and 7 patients with surgical times exceeding 150 minutes. These findings highlight that laparoscopic repair generally resulted in shorter surgical times compared to open repair.

Table 5: Surgical time.

Surgical time	Group I, (n=25)	Group II, (n=25)
90-100	12	1
100-110	8	3
110-120	5	5
120-130	0	0
130-140	0	4
140-150	0	5
> 150	0	7

Surgical time (minutes)

The mean surgical time for group I (laparoscopic repair) was 102.08 minutes, with a standard deviation (SD) of 9.03 minutes. In contrast, group II (open repair) had a significantly longer mean surgical time of 133.52 minutes, with a higher standard deviation of 21.20 minutes.

The difference in mean surgical times between the two groups was found to be highly significant, with a p value of less than 0.0001. This indicates that laparoscopic repair procedures were associated with significantly shorter surgical durations compared to open repair procedures.

Table 6: Surgical time.

Surgical time (Min)	Group I	Group II
Mean	102.08	133.52
SD	9.03	21.20
P value	<0.0001	

Duration of hospital stay

The hospital stay duration varied between group I (laparoscopic repair) and group II (open repair). In group I, none of the patients had a hospital stay of 0-3 days, whereas 4 patients in group II were discharged within this timeframe. Five patients in group I were discharged between 3-7 days, whereas 3 patients in group II had a similar duration of hospital stay.

However, the majority of patients in group I (20 out of 25) were discharged between 7-14 days, whereas none of

the patients in group II fell into this category. Conversely, 18 patients in group II were discharged between 14-21 days, compared to none in group I.

These findings suggest that patients who underwent laparoscopic repair generally had shorter hospital stays, with a higher proportion being discharged within 7-14 days, while patients who underwent open repair tended to have longer hospitalizations, with a significant number requiring a stay of 14-21 days.

Table 7: Duration of hospital stay.

Days	Group 1, (n=25)	Group 2, (n=25)
0-3	0	4
3-7	5	3
7-14	20	0
14-21	0	18

Resumption time (Days)

The mean resumption time for daily activities in group 1 (undergoing laparoscopic repair) was 9.32 days, with a standard deviation (SD) of 2.73 days. In contrast, group 2 (undergoing open repair) had a longer mean resumption time of 13.68 days, with a higher standard deviation of 6.52 days.

The difference in mean resumption times between the two groups was statistically significant, as indicated by the p=0.0042 (S). This suggests that patients who underwent laparoscopic repair generally resumed their daily activities earlier compared to those who underwent open repair.

Table 8: Resumption time (days).

Resumption time (days)	Group I	Group II
Mean	9.32	13.68
SD	2.73	6.52
P value	0.0042 (S)	

DISCUSSION

Hollow viscus perforation poses a severe and life-threatening risk to patients, presenting surgeons with one of the most challenging and complex tasks.[8] A comprehensive understanding of the disease's presentation, early diagnosis, and prompt surgical intervention are essential for effectively managing such cases.[9]

The aim of this study was to compare the outcomes of open versus laparoscopic repair for treating hollow viscus perforation. Group I comprised patients who underwent laparoscopic repair, while group II underwent open repair. Each group consisted of 50 patients.

Table 2 displays the mean age of patients in groups I and II (37.44±10.82 and 38.36±11.14, respectively). The obtained p=0.76 indicates that there was no significant difference in the mean ages between the two groups.

Table 6 presents the surgical times for groups I and II (102.08±9.03 and 133.52±21.20, respectively). The obtained p<0.0001 demonstrates a highly significant difference in surgical times between the two groups.

Table 8 illustrates the resumption time (in days) for routine work in groups I and II (9.32±2.73 and 13.68±6.53, respectively). The obtained p=0.0042 signifies a significant difference in the resumption times between 2 groups.

In the study conducted by Koujalagi et al they included 60 patients diagnosed with hollow viscus perforation, undergoing either laparoscopic repair (Group A, n=30) or open repair (Group B, n=30).[10] The mean ages of patients in groups A and B were 48.30±18.23 and 49.30±15.27 years, respectively, with a predominance of male patients. In terms of clinical characteristics, the duration of vomiting and total leukocyte count (p=0.032) were significantly associated with the incidence of hollow viscus perforation. The mean Mannheim peritonitis index Score was comparable between groups A and B (22.07±4.65 vs. 21.47±5.39). The mean duration of surgery was significantly shorter in group A (105.13±9.57 minutes) compared to group B (120.19 minutes). Additionally, the mean duration of resumption of daily activities was significantly shorter in group A (4.53±0.73 days) compared to group B (11.87±2.93 days). The authors concluded that laparoscopic repair offers benefits in terms of shorter surgical time and earlier resumption of daily activities.

In another study by Zedan et al they included 50 patients diagnosed with perforated duodenal peptic ulcer, divided into two groups: Group A (25 patients) for laparoscopic repair and group B (25 patients) for open repair.[11] In group A, 21 patients underwent successful laparoscopic surgery, while 4 patients required conversion to laparotomy. In group B, 24 patients were evaluated, with one patient succumbing on the fourth postoperative day due to non-surgical causes. The operating time was significantly longer in the laparoscopy group, 145±8.4 versus 110±13 minutes. Patients undergoing laparoscopic repair had lower morbidity, with a p value less than 0.05. No significant difference was noted regarding leaks or intra-abdominal abscesses. Hospital stay was significantly shorter in the laparoscopic group, 6.9±2.2 versus 8.9±3.3 days. Patients undergoing laparoscopic procedures also resumed normal activities earlier compared to those in the laparotomy group.

Bertleff et al demonstrated that laparoscopic closure of perforated peptic ulcers is as safe as conventional open repair.[12] They reported that the operating time was significantly longer in the laparoscopy group (75 vs. 50 minutes). However, a limitation of their study was the small sample size.

Limitations

The study's limitations include a small sample size, single-institution data, and a one-year follow-up period. Variations in surgeon expertise and procedural techniques were not considered. Additionally, some clinical parameters lacked detailed statistical analysis, limiting the study's generalizability and robustness.

CONCLUSION

This study compared laparoscopic and open repair for hollow viscus perforation in 50 patients. Both groups had similar demographics and initial clinical characteristics. The laparoscopic group experienced significantly shorter surgical times (102.08 vs. 133.52 minutes, $p<0.0001$), shorter hospital stays (most discharged within 7-14 days vs. 14-21 days), and quicker resumption of daily activities (9.32 vs. 13.68 days, $p=0.0042$). These findings suggest that laparoscopic repair offers advantages in terms of faster recovery and reduced hospital stays compared to open repair, making it a preferable option for managing hollow viscus perforations.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

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Cite this article as: Shaik NMS, Shaik K. Management of early hollow viscus perforation: laparoscopic repair in contrast to laparotomy repair. Int Surg J 2024;11:1510-4.